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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/550,139	07/10/2006	Bjorn Cederstrom	VALEA 3.3-025	1289
530 7590 05/15/2008 LERNER, DAVID, LITTENBERG, KRUMHOLZ & MENTLIK 600 SOUTH AVENUE WEST WESTFIELD, NJ 07090			EXAMINER MIDKIFF, ANASTASIA	
			ART UNIT 2882	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/550,139	Applicant(s) CEDERSTROM, BJORN	
	Examiner ANASTASIA MIDKIFF	Art Unit 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 15-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 20-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 September 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>21 September 2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-14 and 20-29 drawn to an x-ray refractive element and x-ray system containing said element classified in class 378, subclass 84.
- II. Claims 15-19 drawn to a method of fabricating a multi-prism element classified in class 359, subclass 837.

The inventions are distinct, each from the other because of the following reasons:

Inventions (I) and (II) are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the refractive element of group 1 can be formed by a materially different method that requires etching, cutting or breaking of the element to provide the prisms to be assembled.

Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and examination burden if restriction were not required because one or more of the following reasons apply:

- (a) the inventions have acquired a separate status in the art in view of their different classification;

- (b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;
- (c) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);
- (d) the prior art applicable to one invention would not likely be applicable to another invention;
- (e) the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected invention.**

The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected invention.

If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

During a telephone conversation with Lawrence E. Russ, Reg. No. 35,342, on 09 May 2008, a provisional election was made without traverse to prosecute the invention of invention (I), claims 1-14 and 20-29. Affirmation of this election must be made by applicant in replying to this Office action. Claims 15-19 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "88", see Figure 8.

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures

appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

On Page 3, at Line 22, change "angel" to --angle--.

On Page 6, at Line 4, change "the angel between a triangle shaped prism sides" to --the angle between the triangle shaped prism sides--.

On Page 12, at Line 4 change "dimension-less" to --dimensionless--.

Appropriate correction is required.

Claim Objections

Claims 1-14 and 20-29 are objected to because of the following informalities:

In Claim 1, at Line 4, change "a ray source" to --an x-ray source-- to correct an obvious spelling error.

In Claims 5 and 23, Line 4, the claims recite the phrase "[sic the] width of Multi-Prism Lens (MPL)" wherein there is insufficient antecedent basis for the phrase "Multi-Prism ***Lens***" (emphasis added) in the claims.

In Claims 7 and 25, Line 4 and Line 3, respectively, the claims recite the phrase "the incident ray" wherein there is insufficient antecedent basis for this limitation in the claims.

In Claim 8, at Line 4, change "a ray source" to --an x-ray source-- to correct an obvious spelling error.

In Claim 13, at Line 8, change "a ray source" to --an x-ray source-- to correct an obvious spelling error.

In Claim 14, at Line 7, change "a ray source" to --an x-ray source-- to correct an obvious spelling error.

Claims 2-4, 6, 9-12, 20-22, 24, and 26-29 are objected to based on their dependency.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-14 and 20-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Applied Physics Letters Article to Cederström et al. (19 August 2002).

With respect to Claim 1, Cederström et al. teach a refractive element (Figure 1) suitable for refracting x-rays (Title), comprising:

- a body of low-z material (i.e., aluminum and silicon, Page 1399, Paragraph 1) having a first end adapted to receive rays emitted from a ray source (Page 1401, Paragraph 3) and a second end from which the rays received at the first end emerge (Figure 1);
- said refractive element having columns of stacked, substantially identical prisms (Figure 1 and Page 1399, Paragraph 2).

With respect to Claim 8, Cederström et al. teach a lens suitable for x-rays (Title), comprising:

- a body of low-z material (i.e., aluminum and silicon, Page 1399, Paragraph 1) having a first end adapted to receive rays emitted from a ray source (Page 1401, Paragraph 3) and a second end from which the rays received at the first end are refracted (Figure 1);
- said lens having two portions (Figure 1), each portion including columns of stacked, substantially identical prisms (Page 1399, Paragraph 2);
- said portions being arranged at an angle relative to each other (Figure 1).

With respect to Claim 13, Cederström et al. teach an x-ray apparatus (at the ESRF), comprising:

- at least one x-ray source (Page 1401, Paragraph 3);
- a detector assembly, (Page 1401, Paragraph 3); and,
- a refractive element (Figure 1), comprising:
 - a body of low-z material (i.e., aluminum and silicon, Page 1399, Paragraph 1) having a first end adapted to receive rays emitted

from a ray source (Page 1401, Paragraph 3) and a second end from which the rays received at the first end emerge (Figure 1);

- said refractive element having columns of stacked, substantially identical prisms (Figure 1 and Page 1399, Paragraph 2).

With respect to Claim 14, Cederström et al. teach an x-ray apparatus (at the ESRF), comprising:

- at least one x-ray source (Page 1401, Paragraph 3);
- a detector assembly (Page 1401, Paragraph 3); and,
- a lens (Title, Figure 1), comprising:
 - a body of low-z material (i.e., aluminum and silicon, Page 1399, Paragraph 1) having a first end adapted to receive rays emitted from a ray source (Page 1401, Paragraph 3) and a second end from which the rays received at the first end are refracted (Figure 1);
 - said lens having two portions (Figure 1), each portion including columns of stacked, substantially identical prisms (Page 1399, Paragraph 2);
 - said portions being arranged at an angle relative to each other (Figure 1).

With respect to Claims 2, 9, 20, and 26, the claims are directed towards a product by process, wherein the steps in the process do not impose any physical limitations on the product produced. Consequently, the sole limitation of Claims 2, 9,

and 20, specifically that “said prisms are produced by removal of material, the removed material having a width corresponding to a multiple of a phase-shift length (L_{2n}) of $2n$,” is not given any patentable weight by the examiner.

With respect to Claims 3 and 21, Cederström et al. further teach that said element has an intensity transmission ($T(y)$; see Page 1399, Eqn. 5), a total path length for a ray through the element ($X(y)$; see Page 1399, Eqn. 5), an attenuation length (l ; see Page 1399, Eqn. 5), a constant (k ; see Page 1399, Eqn. 5), and a distance to an optical axis (y ; see Page 1399, Eqn. 5), wherein the intensity transmission is expressed as:

$$T(y) = \exp(-X(y)/l) = \exp(-k|y|l)$$

The examiner notes that the expression for the intensity transmission is a mathematical explanation of the relationship that exists between the variables, and does not impose any structural requirements on the apparatus.

With respect to Claims 4 and 22, Cederström et al. further teach that said element has an effective aperture (D) (described Page 1399, Column 2, Lines 18-20), a focal length (F ; see Page 1399, Eqn. 4), a decrement of a real part of an index of refraction (δ ; see Page 1399, Eqn. 4), an attenuation length (l ; see Page 1399, Eqn. 5), and a side angle of the prisms (θ ; see Page 1399, Eqn. 1 and 2), wherein the effective aperture is expressed as:

$$D = (8 \delta^2 l F) / (\lambda \tan \theta)$$

The examiner notes that the expression for the effective aperture is a mathematical explanation of the relationship that exists between the variables, and does not impose any structural requirements on the apparatus.

With respect to Claims 5 and 23, Cederström et al. further teach that said element has an aperture increase factor (AIF) (described Page 1400, Column 1, Lines 1-23), a root mean square width of the aperture of the element (σ_{abs} ; see Page 1400, Eqn. 7 and 10), a 2-n shift length (L_{2n} ; see Page 1399, Column 2), and a side angle of the prisms (θ ; see Page 1399, Eqn. 1 and 2), wherein the AIF is expressed as:

$$AIF = 3.2 \cdot (\sigma_{abs}) / (L_{2n} \tan \theta)$$

The examiner notes that the expression for the AIF is a mathematical explanation of the relationship that exists between the variables, and does not impose any structural requirements on the apparatus.

With respect to Claims 6 and 24, Cederström et al. further teach that said element is made of silicon (Abstract).

With respect to Claims 7 and 25, Cederström et al. further teach that a focal length is controlled according to a deviation length (y_g) of one end of the element with respect to the incident ray (Page 1399, Paragraph 2).

With respect to Claims 10-12 and 27-29, Cederström et al. further teach that said columns are arranged in series, and that columns of one portion are displaced from columns of a second portion by relative rotation (Figure 1).

Claims 1-14 and 20-29 are rejected under 35 U.S.C. 102(b) as being anticipated by KTH thesis to Cederström (8 November 2002).

With respect to Claim 1, Cederström teaches a refractive element suitable for refracting x-rays (Abstract, Paragraph 1), comprising:

- a body of low-z material (i.e., silicon, beryllium, diamond; see Abstract, Paragraph 3) having a first end adapted to receive rays emitted from a ray source (Figure 1.1) and a second end from which the rays received at the first end emerge (Figure 1.1);
- said refractive element having columns of stacked, substantially identical prisms (Page 37, Figure 5.1 and Paragraph 2).

With respect to Claim 8, Cederström teaches a lens suitable for x-rays (Abstract, Paragraph 1), comprising:

- a body of low-z material (i.e., silicon, beryllium, diamond; see Abstract, Paragraph 3) having a first end adapted to receive rays emitted from a ray source (Figure 1.1) and a second end from which the rays received at the first end are refracted (Page 37, Figure 5.1 and Paragraph 2);
- said lens having two portions, each portion including columns of stacked, substantially identical prisms (Page 37, Figure 5.1 and Paragraph 2);
- said portions being arranged at an angle relative to each other (Figure 5.1).

With respect to Claim 13, Cederström teaches an x-ray apparatus (Figure 5.7), comprising:

- at least one x-ray source (Figure 5.7);
- a detector assembly (Figure 5.7); and,
- a refractive element (Figure 5.1), comprising:
 - a body of low-z material (i.e., silicon, beryllium, diamond; see Abstract, Paragraph 3) having a first end adapted to receive rays emitted from a ray source (Figure 1.1) and a second end from which the rays received at the first end emerge (Figure 1.1);
 - said refractive element having columns of stacked, substantially identical prisms (Page 37, Figure 5.1 and Paragraph 2).

With respect to Claim 14, Cederström teaches an x-ray apparatus (Figure 5.7), comprising:

- at least one x-ray source (Figure 5.7);
- a detector assembly (Figure 5.7); and,
- a lens (Figures 1.1 and 5.1), comprising:
 - a body of low-z material (i.e., silicon, beryllium, diamond; see Abstract, Paragraph 3) having a first end adapted to receive rays emitted from a ray source (Figure 1.1) and a second end from which the rays received at the first end are refracted (Page 37, Figure 5.1 and Paragraph 2);
 - said lens having two portions, each portion including columns of stacked, substantially identical prisms (Page 37, Figure 5.1 and Paragraph 2);

- said portions being arranged at an angle relative to each other
(Figure 5.1).

With respect to Claims 2, 9, 20, and 26, the claims are directed towards a product by process, wherein the steps in the process do not impose any physical limitations on the product produced. Consequently, the sole limitation of Claims 2, 9, and 20, specifically that “said prisms are produced by removal of material, the removed material having a width corresponding to a multiple of a phase-shift length (L_{2n}) of $2n$,” is not given any patentable weight by the examiner.

With respect to Claims 3 and 21, Cederström further teaches that said element has an intensity transmission ($T(y)$) (described Page 42, Eqn. 5.26), a total path length for a ray through the element ($X(y)$; see Page 40, Eqn. 5.13), an attenuation length (l ; see Page 40, Eqn. 5.17), a constant (k ; see Page 111, Eqn.12.14), and a distance to an optical axis (y ; see Page 41, Eqn. 5.19), wherein the intensity transmission is expressed as:

$$T(y) = \exp(-X(y)/l) = \exp(-k|y|l)$$

The examiner notes that the expression for the intensity transmission is a mathematical explanation of the relationship that exists between the variables, and does not impose any structural requirements on the apparatus.

With respect to Claims 4 and 22, Cederström further teaches that said element has an effective aperture (D) (described Pages 40-42 and 59), a focal length (F ; see Page 59, Eqn. 6.19), a decrement of a real part of an index of refraction (δ ; see Page 59, Eqn. 6.19), an attenuation length (l ; see Page 59, Eqn. 6.19), and a side angle of

the prisms (θ ; see Page 40, Eqn. 5.13 and 5.15), wherein the effective aperture is expressed as:

$$D = (8 \delta^2 I F) / (\lambda \tan \theta)$$

The examiner notes that the expression for the effective aperture is a mathematical explanation of the relationship that exists between the variables, and does not impose any structural requirements on the apparatus.

With respect to Claims 5 and 23, Cederström further teaches that said element has a root mean square width of the aperture of the element (σ_{abs} ; see Page 41, Eqn. 5.19), a $2\text{-}\pi$ shift length ($L_{2\pi}$; see Page 41, Eqn. 5.23 and Page 109, Paragraph 1), and a side angle of the prisms (θ ; see Page 40, Eqn. 5.13 and 5.15), wherein an aperture increase factor (AIF) is expressed as:

$$\text{AIF} = 3.2 \cdot (\sigma_{\text{abs}}) / (L_{2\pi} \tan \theta)$$

The examiner notes that the expression for the AIF is a mathematical explanation of the relationship that exists between the variables, and does not impose any structural requirements on the apparatus.

With respect to Claims 6 and 24, Cederström further teaches that said element is made of one of silicon and diamond (Page 73, Paragraph 1).

With respect to Claims 7 and 25, Cederström further teaches that a focal length is controlled according to a deviation length (y_g) of one end of the element with respect to the incident ray (Abstract, Paragraph 1; Figure 5.1, and Page 40, Paragraph 2).

With respect to Claims 10-12 and 27-29, Cederström further teaches that said columns are arranged in series (Page 37, Figure 5.1 and Paragraph 2), and that

columns of one portion are displaced from columns of a second portion by relative rotation (Page 37, Figure 5.1 and Paragraph 2).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent Documents to: Minott (US 4,350,410) teaches a multi-prism refractive element having a column of stacked prisms; Nygren et al. (US 6,091,798) teaches compound refractive x-ray lenses, with opposing stacks of cone-shaped elements, but without prisms; Whitehead et al. (US 6,215,920 B1) teaches a multi-prism refractive element made through etching processes; Cederstrom (US 6,668,040 B2) teaches a refractive element for x-rays with portions having prism shaped columns of low-z material relatively rotated to one another; and Polichar et al. (US 2003/0210763 A1) teaches a refractive element for use with x-rays and in an x-ray apparatus having a linear prismatic refractive lens formed of a column of micro-prisms.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANASTASIA MIDKIFF whose telephone number is (571)272-5053. The examiner can normally be reached on M-F 7-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on 571-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2882

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Anastasia Midkiff/
Examiner, Art Unit 2882
5/12/08

/Edward J Glick/
Supervisory Patent Examiner, Art Unit 2882